Case study | 000433

ISQ 7610

Creature Comforts Brewing Co.

Maintaining quality in the brewing process with the ISQ 7610 GC-MS

"The team from Thermo Fisher Scientific are supportive and easy to work with. Their knowledge base is deep and wide, and there is always someone specialized for helping solve problems."

—Spencer Britton, Creature Comforts Brewing Co.

Thermo Scientific ISQ 7610 single quadrupole GC-MS

The craft brewery industry in the United States has exploded over the last 10 years. Beer consumers demand quality products that are produced consistently brew after brew. A change in taste from one batch to the next is not acceptable and may cause consumers to move on to another craft brewery brand. Maintaining consistency of the product and keeping up with a high demand are major challenges for craft breweries. To continue ensuring the quality and safety of their product, Creature Comforts Brewing Co. has built an extensive custom laboratory to handle the myriad tests required and new capabilities that are continually added.

Spencer Britton is a senior quality lab specialist at Creature Comforts and sees in-house testing as critical to maintain the high standards of the brewery. According to Britton, “One of the primary reasons for needing to be able to test in-house is timeliness. We’re a high-speed manufacturing facility constantly balancing timelines to stay as efficient as possible. Being able to run these tests ourselves lets us act on the results more quickly than sending them to an outside lab.” Another benefit of in-house testing was to control the chain of custody of the sample. The lab team can ensure the samples are collected, stored, and prepared correctly throughout the testing process.

Designing the laboratory was no small feat for Creature Comforts. The lab was carefully set up with a few things in mind. Britton explained; “One of the most crucial things in designing the lab was making every bit of space count, as we knew we would use all that space sooner than later. We break our lab responsibilities down into three main areas of focus: analytical, micro, and sensory. Our layout reflects this in quite a few ways. We have a wall, counterspace, a refrigerator, and an entire set of lab tools dedicated to being sensory-safe. Our micro testing area is its own room that can be closed off to help mitigate contamination while working in the biological safety cabinet.”

One of the biggest desires for the laboratory was to be able to perform GC and GC-MS tests. Creature Comforts Brewing lab purchased a Thermo Scientific™ ISQ™ 7000 single quadrupole GC-MS and later beta tested the Thermo Scientific™ ISQ™ 7610 single quadrupole GC-MS for their quality control. The ISQ 7610 MS with the Thermo Scientific™ TRACE™ GC allowed samples to be analyzed by mass spectrometer or other detectors on a single platform, saving valuable laboratory space. Britton discussed the methods they performed on their new GC-MS, “We first developed methods to look at some of the most commonly encountered or discussed volatile compounds in the beer world[1]. We found that some of these methods could be consolidated pretty easily while still allowing for precise quantification, and we were able to develop a single method out of several. By condensing the American Society of Brewing Chemists' (ASBC) Beer 29, Beer 44, and Beer 48 Methods into a single screening run, we’re able to save time, brain power, consumables, and helium!” This method consolidation allowed the brewery to test for more compounds rapidly and enact rapid changes in the brewing process before they became an issue.

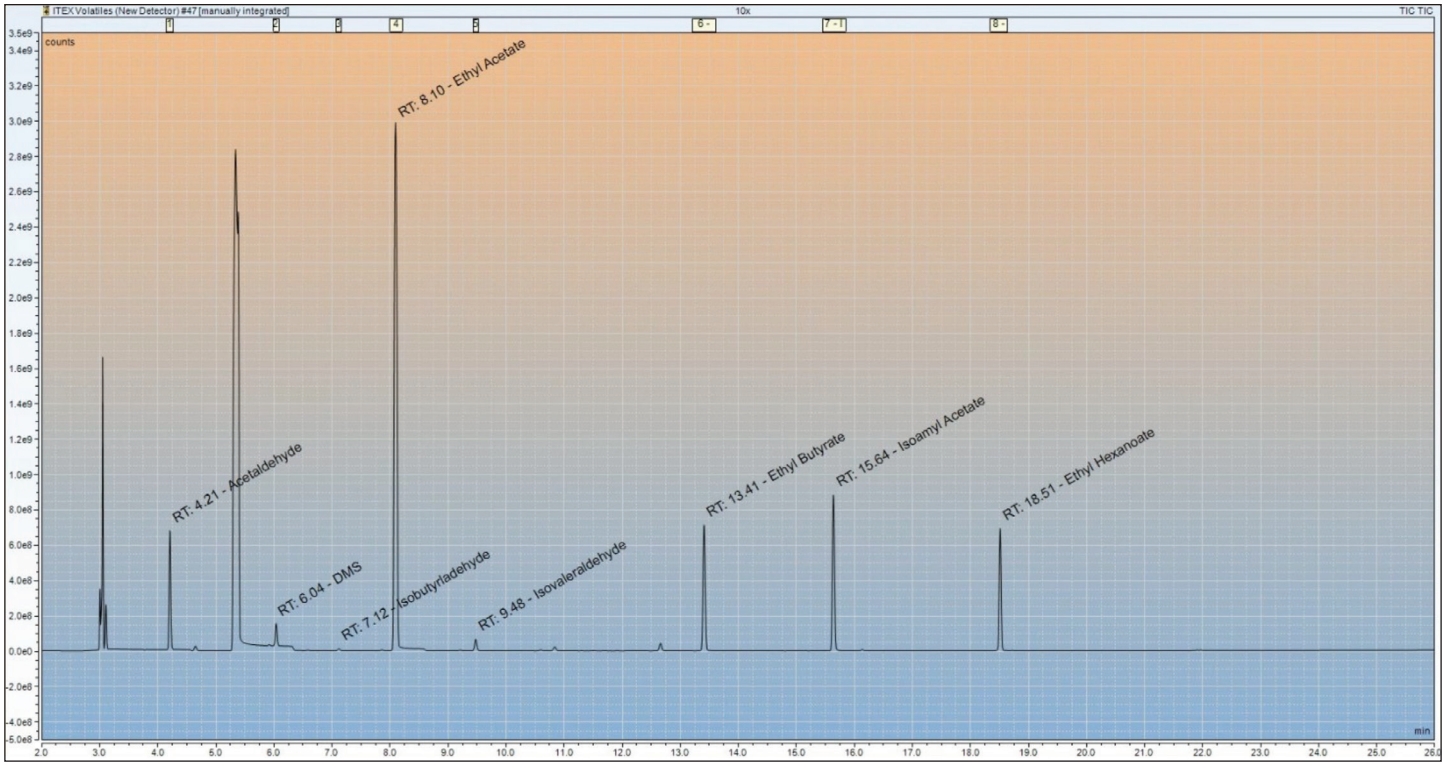


Figure 1. Chromatogram showing combined methods for Beer 29, Beer 44, and Beer 48 on the ISQ 7610 GC-MS analyzing a standard curve point in 5% ethanol

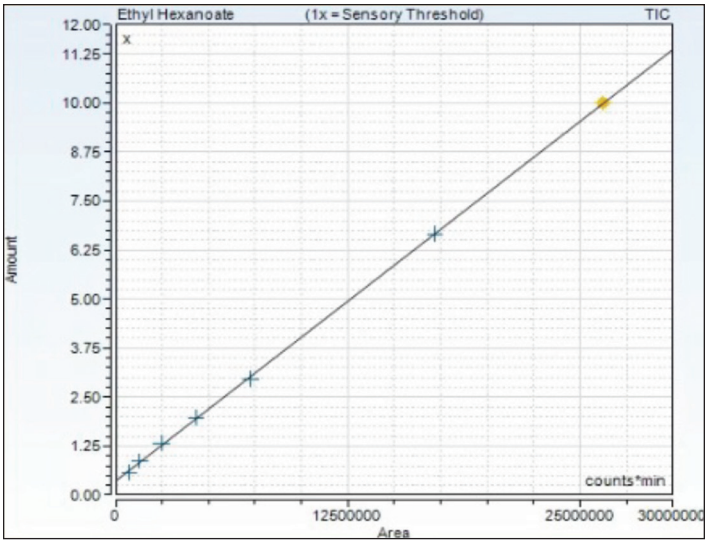


Figure 2. Calibration curve for ethyl hexanoate in 5% ethanol using the ISQ 7610 GC-MS

The laboratory performs several other tests on every batch of beer. Fermentation status is performed daily on all the brewery tanks and includes tests for alcohol content, pH, and density. These trends are plotted and allow for any issues to be detected early in the process. Several microbiological tests are also performed to ensure no beer spoiling organisms are present in the beer or equipment throughout the brewery. One critical daily test for the lab is quantifying vicinal diketones (VDKs). This test is performed prior to cooling the beers and ceasing fermentation to ensure that certain unwanted flavors will not present after the product is packaged.

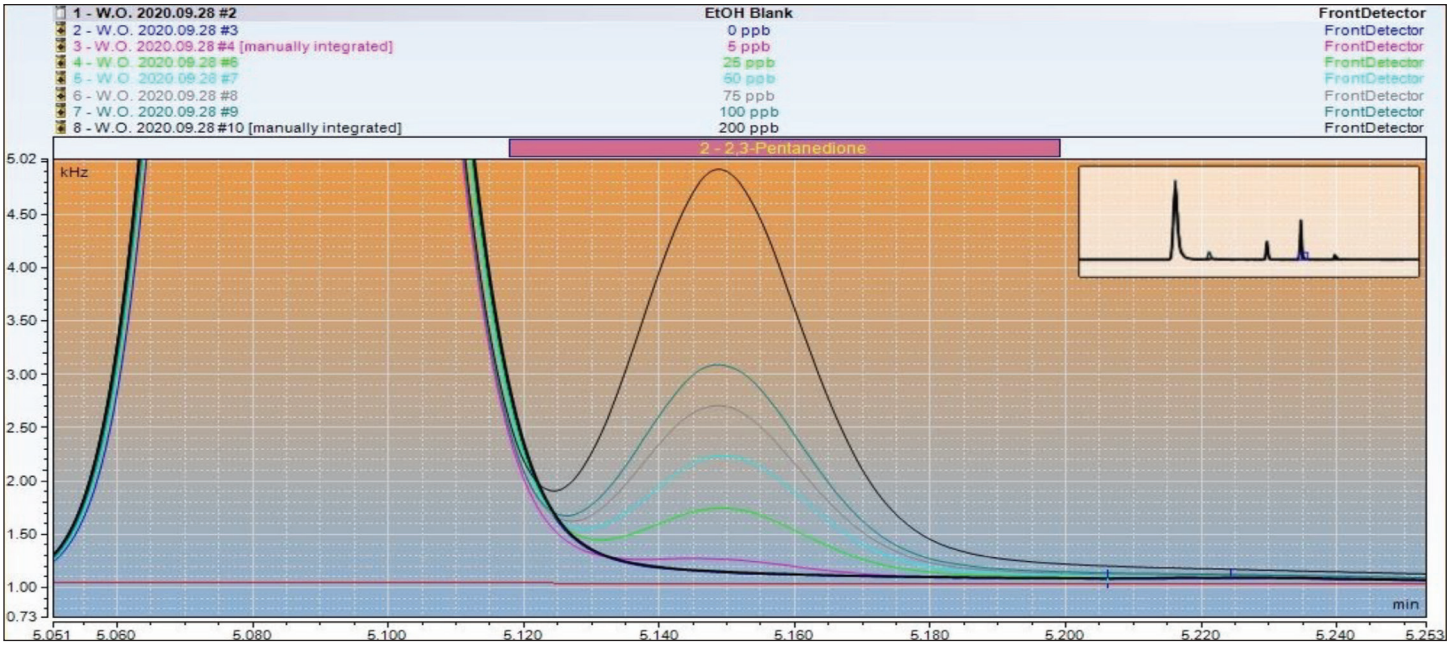


Figure 3. Vicinal diketones (VDKs) analysis: Chromatogram showing 2,3-pentanedione from 5 to 200 ppb using the TRACE 1310 GC and an ECD detector

"By using the ISQ 7610 GC-MS to condense the ASBC's Beer 29, Beer 44, and Beer 48 Methods into a single screening run, we're able to save time, brain power, consumables, and helium!"

—Spencer Britton

The most rigorous test performed at the brewery, however, is not performed on an analytical system. The tasting panel is a group of trained and talented tasters that ensure the beer meets the brewery's strict standards. Britton explained, "Every lot of every beer we produce is run past our sensory panelists, all of whom have been through an extensive training course. This panel decides whether a beer is ready to go to market or must be held for any additional testing, adjustments, or destruction."

For the future, Creature Comforts is looking to add more testing to their GC-MS system. The lab is planning to look at smoke taint analysis of beer. This has been a major concern in the last few years due to the wildfires on the West Coast of the USA where hops for the beer are grown. Other projects on Britton's list include monitoring barrel-aged beer, tetrahydropyridine (THP) off flavors, and analysis of stouts. "We have a lot of future projects we're excited about using our ISQ 7610 GC-MS for. Our interests and goals vary from better QC practices, to industry research, to developing and analyzing new brands and styles."

Conclusion

Ensuring a consistent, quality product for craft breweries is essential for their reputation and customer experience. By bringing the testing in-house, Creature Comforts Brewery has been able to act on issues rapidly, maintain high production, and ensure the highest quality product is delivered to its customers. The ISQ 7610 GC-MS system has allowed the lab to consolidate methods and has the future flexibility to expand the testing capability of the brewery.

About Spencer Britton

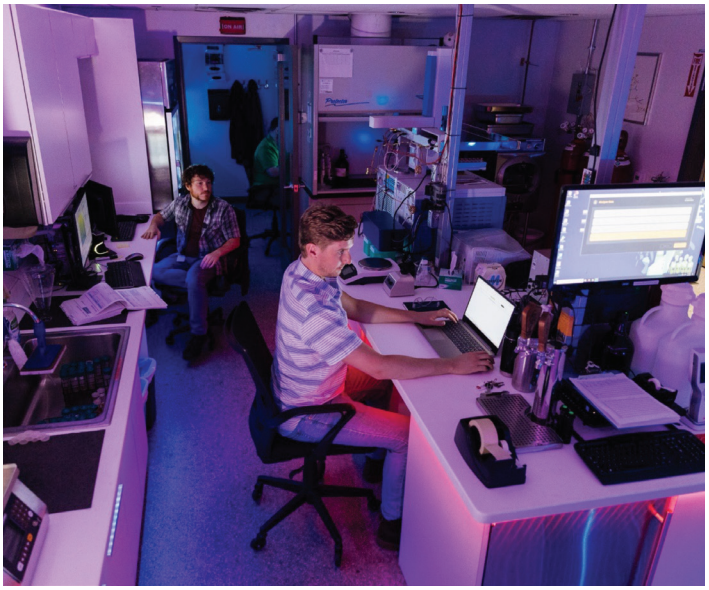
Spencer Britton is a Senior Quality Lab Specialist at Creature Comforts Brewing Company in Athens, GA. Before joining the brewing industry in May 2017, he worked in a biopharmaceutical laboratory focusing on protein chemistry and ELISA development. Spencer is passionate about ensuring quality products and practices, which has led him to collaborate across the brewing industry to help establish key testing protocols.

"The ISQ 7610 GC-MS is an easy-to-use and maintain system that has a lot of flexibility in how it's used. It helps us run side-by-side experiments to find out what impact ingredient and process changes might have."

—Spencer Britton

About Creature Comforts Brewing Company

Since opening its doors in April 2014, Creature Comforts Brewing has aspired to foster human connection and help people navigate the beautiful, complex world of craft beer. As a Certified B Corporation, Creature Comforts Brewing is committed to being a force for good in both the craft beer and local Athens communities. The brewery offers a wide range of beer styles with a focus on finely balanced flavors. It has made an imprint in the craft beer community for its award-winning year-round and limited release beers, as well as for its commitment to local communities through its community-impact programs.



Custom built lab at Creature Comforts Brewing Co.

Reference

1. ASBC brewing methods: https://www.asbcnet.org/methods/pages/default.asp

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